Alexco Keno Hill Mining Corp.

Bellekeno Mine Operations

Water Management Plan and Water Balance Report

Water Use Licence QZ09-092

February 2011

Prepared by:

ACCESS
CONSULTING GROUP

TABLE OF CONTENTS

1.0 INTRODUCTION....1
1.1 Purpose of Plan....1
2.0 LOCATION AND DESCRIPTION....3
3.0 DETAILED WATER BALANCE REPORT....5
3.1 Mill Water Balance Model....5
3.1.1 Mill Water Balance Methodology....5
3.1.2 Mill Water Balance Input Parameter Verification....14
3.3 Mine Water Balance Model....16
3.3.1 Mine Water Balance Methodology....16
3.3.2 Mine Water Balance Input Parameter Verification....23
3.4 Water Balance Report Annual Update....24
4.0 Water Management Protocols....24
4.1 Bellekeno Mine Water Requirements....24
4.2 Mill Site Water Requirements....26
4.3 Water Use Tracking....28
5.0 Contingency Plans....23
5.1 Drought Conditions....23
5.2 Flood Conditions....23
5.3 High Mine Inflow Conditions....24
6.0 REPORTING....26

LIST OF TABLES

Table 1. Mill Water Balance....11
Table 2. Mill Water Balance Model Parameter Verification Summary....15
Table 3. Mine Water Balance....19
Table 4. Mine Water Balance Model Parameter Verification Summary....23

LIST OF FIGURES

Figure 1. Mill and DSTF Site Location....4
Figure 2. Bellekeno Mine Discharge at KV-43....18
Figure 4. Bellekeno Mine Water Balance Schematic....25
Figure 5. Mill Water Balance Schematic....27
Figure 6. Sludge and Water Tracking Log....21
Figure 7. Bellekeno 625 Flow Data Logger Record....22

1.0 INTRODUCTION

1.1 *Purpose of Plan*

This plan is submitted to fulfill the conditions set out in Part H, Clauses 69-74 of Water Licence QZ09-092 issued to Alexco Keno Hill Mining Corp (AHKM) on August 19th 2010:

Detailed Water Balance Report

69. Within six months of the effective date of this licence, the Licensee shall submit a detailed site wide water balance report for the Flame and Moth Site and the Bellekeno Mine. The report shall be based on considering a range of potential input hydrology scenarios in a detailed water balance model developed for the site areas.

70. Input hydrology scenarios shall be developed based on an update of meteorological, stream flow, and groundwater parameters for the site areas including:

a) updated meteorological inputs including precipitation, snowmelt, evaporation, and evapo-transpiration;

b) stream flow monitoring results; and

c) short-term and long term mine inflow predictions.

71. The water balance model shall be capable of modelling all key phases of the project, accounting for production changes, changing surface and underground developments,

surface and underground storage volumes, and changing water use requirements associated with the operations and closure phases of the Bellekeno Undertaking.

72. A subset of the water balance model shall specifically investigate and report on the water balance of the DSTF that accounts for potential runoff, infiltration, and draindown seepage that may occur at this facility during operations and closure.

73. The water balance report shall be updated annually.

Water Management Plan

74. Within six months of the effective date of this licence, the Licensee shall submit to the Board a plan titled, "*Bellekeno Water Management Plan*", and shall implement that plan. The plan shall be based on a detailed water balance and shall include but not be limited to:

a) Protocols, such as water quality requirements, to identify when and for what purpose water other than treated discharge or mine pool water can be used at the Bellekeno Mine;

b) Protocols to identify when and for what purpose water other than Galkeno 900 treated discharge water or water stored at the Flame and Moth collection and sediment pond can be used at the Flame and Moth Site;

c) Procedures and methods for accounting for water use at the Bellekeno Mine and Flame and Moth Site;

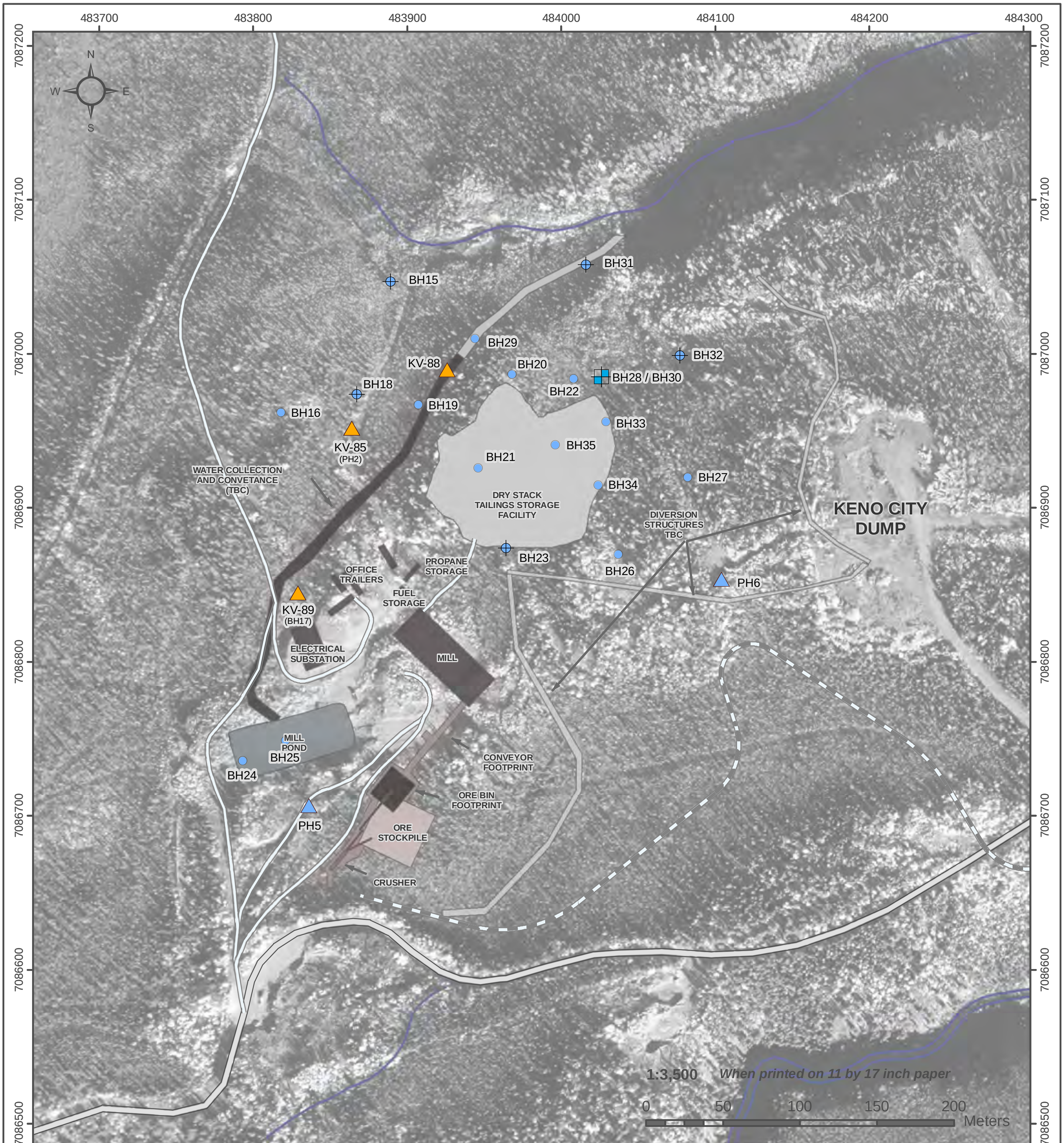
d) Procedures and methods for verifying water balance assumptions and collecting water balance input data such as site runoff, precipitation, evaporation, and DSTF seepage; and

e) Contingency plans for operations related to flood or drought conditions and high mine inflow conditions.

This plan outlines the methodology that will be followed to comply with the requirements of these clauses at the Bellekeno Mine and Mill on Alexco's Keno Hill property.

2.0 LOCATION AND DESCRIPTION

The Keno Hill Silver District is located in central Yukon Territory, 354 km (by air) due north of Whitehorse. The Bellekeno mine area is located approximately 3 km east of Keno City within the Keno Hill Silver District. The mill site and Dry Stack Tailings Facility (hereinafter referred to as the "DSTF") are located approximately 1 km west of Keno City on the Flame and Moth property, while the mine is located approximately 3 km to the east of Keno City (Figure 1). The mill and DSTF are located in the upper Christal Creek drainage.



- Monitoring Well
- Monitoring Well and Ground Temperature
- Proposed Monitoring Well
- Ground Temperature
- Slope Indicator
- Bore Hole
- Mill Access Road
- Haul Road
- Duncan Creek Road
- Major Contour (5 meter interval)
- Minor Contour (1 meter interval)

QZ09-092 GROUNDWATER MONITORING PLAN

FIGURE 1 - MILL SITE AREA BOREHOLE AND GROUNDWATER MONITORING LOCATIONS

AKHM ACCESS

Aerial photography flight date: July 13th 2006. Ortho-rectification produced by Challenger Geomatics Ltd. Site hydrography and contours derived from 2006 aerial imagery. Mill pond survey (Y.E.S. Sept 2010), mill structures, current DSTF footprint and roads survey (ACG, December 2011). Design data obtained from EBA.

DRAWN BY MD	FEB 2011	VERIFIED BY EA

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3.0 DETAILED WATER BALANCE REPORT

3.1 *Mill Water Balance Model*

An operational water balance model for the mill site has been developed that is designed to predict mill pond volumes based on various climatic and operational inputs and changes. As the mill transitions into an active operation, the model will be calibrated on a monthly basis based on actual pond volume against predicted volume and therefore will become optimized and more accurate as operations continue. Because the mill site is located in a headwater basin and does not dam any streams, stream flow is not a consideration in the water balance.

3.1.1 *DSTF Water Balance Subset*

In accordance with Clause 72 of the Licence, a subset of the mill water balance is presented as page 4 of Table 1 which accounts for potential runoff, infiltration and draindown seepage which is predicted for the DSTF on a monthly basis for the upcoming year. Because final design for the DSTF has not been complete as of the writing of this plan, the model has not contemplated a closure scenario. This modeling will be completed during the next annual update, as required by Clause 73 of the Licence.

3.1.2 *Mill Site Water Balance Methodology*

Table 1 and Figure 2 represent the mill water balance model input and output parameters. All columns in the model are labelled from “A” to “AJ” and the calculation methodology for each column is described following. Red coloured fonts indicate data input entries and black coloured fonts indicate calculated data.

Columns A and B are climatic inputs:

- Column A **“Precip”** – estimated monthly precipitation based on 1996 Site Characterization Report. Actual measured site total precipitation to be verified at the end of each month and estimated average monthly total precipitation thereafter.
- Column B **“Lake Evaporation”** – estimated lake evaporation using WREVAP Model as presented in 1996 Site Characterization Report. Although shown in the model,

evaporation is currently not used in the model for estimating pond volumes. This adds conservatism to the model.

Columns C to K are mill operations parameters:

- Column C **"ROM Ore Milled"** - actual tonnes of ore milled based on weightometer readings each month. Future months based on the current life-of-mine plan.
- Column D **"Initial ROM Ore Moisture"** – amount of moisture in the ROM ore from the underground mine prior to milling. Based on actual measurements each month and estimated average for future months.
- Column E **"Ore to Concentrate"** – the actual and estimated portion of ore milled that ends in Pb or Zn concentrate and is shipped offsite.
- Column F **"Ore to HP Tailings"** – the actual and estimated portion of ore milled that ends up as high pyrite tailings.
- Column G **"Ore to LP Tailings."** - the actual and estimated portion of ore milled that ends up as low pyrite tailings.
- Column H **"HP Tailings to DSTF"** – the portion of the HP tailings that is transported and stored in the DSTF. The balance is transported to underground.
- Column I **"LP Tailings to DSTF"** – the portion of the LP tailings that is transported and stored in the DSTF. The balance is transported to underground.
- Column J **"Concentrate Moisture"** – the estimated and actual amount of moisture in the Pb and Zn concentrates that is shipped offsite.
- Column K **"Tailings Moisture"** - the estimated and actual amount of moisture in the tailings that is either stored in the DSTF or transported to underground.

Columns L to P are input data or calculations of operational areas within the system, such as which areas will accumulate inflows due to precipitation.

- Column L **"Mill Process Pond Catchment Area"** - total horizontal planar area of the mill pond, which accounts for direct precipitation into the pond.

- Column M **"Lined DSTF Catchment Area"** – total horizontal planar area that is lined within the DSTF footprint. Based on actual each month and estimated thereafter.
- Column N **"Unlined DSTF Catchment Area"** – total horizontal planar area of the DSTF footprint that is not lined.
- Column O **"Mill Pad Catchment Area"** - total horizontal planar area of the mill site location that drains into the mill pond. Does not include the area of the DSTF which is accounted for in M and N.
- Column P **"Mill/DSTF Catchment Area"** – Total of lined and unlined DSTF and mill pad catchment areas.

Columns Q to Y are input and calculated fields showing the various input sources and volumes of water that enter the mill system.

- Column Q **"Mill Pond Precip"** - the calculated volume of water that falls directly over the mill pond area and is accounted for each month (area *times* precip).
- Column R **"Lined DSTF Precip"** - the calculated volume of water that falls directly over the DSTF lined area and is accounted for each month (area *times* precip).
- Column S **"Unlined DSTF Precip"** - the calculated volume of water that falls directly over the DSTF unlined area and is accounted for each month (area *times* precip).
- Column T **"Mill Pad Precip"** - the calculated volume of water that falls directly over the mill pad area and is accounted for each month (area *times* precip).
- Column U **"Monthly Runoff Coefficient"** – a monthly coefficient that is used to calculate the cumulative precipitation during the Oct – May period that reports to the system. If the coefficient is 0% then none of the snow that falls during that period actually melts and reports to the mill pond. If the coefficient is 100% than all of the precip that falls during that month reports to the mill pond. Precipitation that is accounted for during the October – April period is calculated and then assumed to report to the mill pond by the end of May.
- Column V **"Monthly Runoff Account"** – tracks and accounts for the total calculated precipitation volume by area each month.

- Column W **“Monthly Runoff”** – the cumulative precipitation during the period that reports to the mill pond system as water and is a function of the monthly runoff coefficient and the calculated volume of precipitation for each area. The cumulative precipitation reporting is calculated as the monthly runoff coefficient *times* the precipitation *times* the areas.
- Column X **“Fresh Makeup Water Added”** – the total amount of fresh water added to the mill pond each month from external makeup water sources including Galkeno 900, Christal Lake and/or Christal Creek.
- Column Y **“TOTAL WATER IN”** – the total amount of water that enters the mill pond each month from all of the individual sources of input water in Columns Q – X.

Columns Z to AD are calculated fields showing the various sources of water losses that leave the mill system each month.

- Column Z **“Concentrate Moisture Loss”** – the total amount of water loss in the Pb and Zn concentrates that leaves the system from retained water and is transported off site.
- Column AA **“Tailings Moisture Loss”** – the total amount of water loss in the tailings that is retained long-term in the DSTF. The moisture level in the tailings in the DSTF will fluctuate over time after the tailings have been deposited but the degree of fluctuation is not a significant variable in mill pond water volume predictions and not accounted for in this water balance model.
- Column AB **“Treat and Release Losses”** – the total amount of water treated and released (if necessary) each month.
- Column AC **“TOTAL WATER LOSSES”** – the total volume of all water losses for the month.
- Column AD **“Net Water Inflow”** – the total net increase or decrease volume of water in the system during the month, sum of Water In + Water Losses.

Columns AE to AH are calculated fields that summarize the predicted mill pond volume at the end of each month, based on the water inputs and losses from all of the sources presented above.

- Column AE **"Actual Pond Volume"** – the total amount of water in the pond at the end of each month based on month end readings. This field represents the actual volume that is used to compare to the estimated volume and therefore allows a calibration of the model.
- Column AF **"Model Pond Volume Beginning"** – the calculated volume of water in the mill pond at the beginning of each month. The beginning pond volume for each month equals the ending pond volume for the previous month.
- Column AG **"Model Pond Volume End"** – the calculated volume of water in the mill pond at the end of each month. The ending pond volume for each month equals the beginning pond volume plus the total net input or losses from all sources during the month.
- Column AH **"100 Year Freshet Event – 30 day period"** – the estimated volume of water that would enter the mill pond from during a 30 day period during the 1:100 year conservative freshet + precipitation event, based on Clearwater Consultants 2010.

Columns AI to AU pertain to the DSTF water balance, and are calculated based on operational input data, mill catchment areas, coefficients, and DSTF infiltration coefficients.

Columns AI to AL are all inputs to the DSTF water balance:

- Column AI **"Total Precipitation to Unlined DSTF Area"** – the calculated total precipitation falling on the unlined portion of the DSTF (area x precipitation).
- Column AJ **"Total Precipitation to Lined DSTF Area"** – the calculated total precipitation falling on the lined portion of the DSTF (area x precipitation).
- Column AK **"Tailings Compaction Seepage"** – the calculated total seepage expected during compaction. Because actual measured tailings moisture content to date have been lower than optimum or saturation moisture content, these numbers are negative.

- Column AL **“Total Inputs”** – a sum of columns AI-AK.

Columns AM to AQ are all outputs to the DSTF water balance:

- Column AM **“Unlined DSTF Meteoric Infiltration to Ground”** – the calculated total precipitation falling on the unlined portion of the DSTF (area x precipitation) multiplied by the unlined DSTF area infiltration coefficient.
- Column AN **“Lined DSTF Meteoric Infiltration to Ground”** – the calculated total precipitation falling on the lined portion of the DSTF (area x precipitation) multiplied by the lined DSTF area infiltration coefficient added to the tailings compaction seepage, multiplied by the GCL liner capture coefficent.
- Column AO **“Unlined DSTF Runoff”** – the calculated total precipitation falling on the unlined portion of the DSTF (area x precipitation) multiplied by unlined DSTF runoff coefficient.
- Column AP **“Lined DSTF Runoff”** – the calculated total precipitation falling on the lined portion of the DSTF (area x precipitation) multiplied by lined DSTF runoff coefficient.
- Column AL **“Total Outputs”** – a sum of columns AM-AP.
- Column AR “**Lined DSTF Meteoric Infiltration to Pile**” -- the calculated total precipitation falling on the lined portion of the DSTF (area x precipitation) multiplied by lined DSTF infiltration coefficient. This is an internal calculation used in the calculation of column AN.
- Column AL **“Expected Total Reporting to DSTF Collection”** – a difference between total inputs and total outputs.

Columns AT to AU will be used to verify the DSTF water balance:

- Column AT **“Measured Tailings Moisture Content”** – actual measured tailings moisture content.
-
- Column AU **“Measured DSTF Input to Mill Site Pond”** – actual measured water reporting to Mill Site Pond.

Table 1. Alexco Keno Hill Mining Corp Keno Hill District Mill Site Water Balance Model

DSTF Infiltration Coefficients		Catchment Area Runoff Coefficients	
DSTF Optimum Moisture Content	16.5%	Mill Pond Surface	100%
Meteoric Infiltration into DSTF	0%	Lined DSTF Catchment	100%
Unlined DSTF Infiltration to Ground	20%	Mill Area Catchment	45%
GCL Liner Capture Coefficient	100%	Unlined DSTF Catchment	80%

Text in black are calculated
Text in red are design inputs
Text in blue are projected inputs
Text in green are verification measurements

Water Balance Model Equation
Beginning Pond Volume + Water IN - Water LOSSES = Ending Pond Volume

	CLIMATIC INPUTS		MILL OPERATIONS DATA								
Month	Precip.	Lake Evaporation	ROM Ore Milled	Initial ROM Ore Moisture	Ore to Concentrate	Ore to HP Tailings	Ore to LP Tailings	HP Tailings to DSTF	LP Tailings to DSTF	Concentrate Moisture	Tailings Moisture
Units	mm	mm	tonnes	%	%	%	%	%	%	%	%
Column =>	A	B	C	D	E	F	G	H	I	J	K
	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
Jan-11	23	0	7,750	3.00%	25%	0%	75%	0%	100%	10.00%	14%
Feb-11	29	0	7,000	3.00%	25%	0%	75%	0%	100%	10.00%	14%
Mar-11	18	0	7,750	3.00%	25%	0%	75%	0%	100%	10.00%	14%
Apr-11	18	42	7,500	4.00%	25%	0%	75%	0%	50%	10.00%	14%
May-11	23	86	7,750	5.00%	25%	0%	75%	0%	50%	10.00%	14%
Jun-11	39	109	7,500	5.00%	25%	0%	75%	0%	50%	10.00%	14%
Jul-11	66	111	7,750	5.00%	25%	0%	75%	0%	50%	10.00%	14%
Aug-11	56	85	7,500	4.00%	25%	0%	75%	0%	50%	10.00%	14%
Sep-11	44	27	7,750	4.00%	25%	0%	75%	0%	50%	10.00%	14%
Oct-11	47	0	7,500	3.00%	25%	0%	75%	0%	50%	10.00%	14%
Nov-11	39	0	7,750	3.00%	25%	0%	75%	0%	50%	10.00%	14%
Dec-11	35	0	7,500	3.00%	25%	0%	75%	0%	50%	10.00%	14%

MILL CATCHMENT AREAS					WATER IN - m^3								
Mill Process Pond Catchment Area	Lined DSTF Catchment Area	Unlined DSTF Catchment Area	Mill Pad Catchment Area	Mill/DSTF Catchment Area	Mill Pond Precip	Lined DSTF Precip	Unlined DSTF Precip	Mill Pad Precip	Monthly Runoff Coefficient	Monthly Runoff Account	Monthly Runoff	Fresh Makeup Water Added	TOTAL WATER IN
m^2	m^2	m^2	m^2	m^2	m^3	m^3	m^3	m^3	%	m^3	m^3	m^3	m^3
L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
Input	Input	Input	Input	Input	Calc	Calc	Calc	Calc	Input	Input	Input	Input	Calc
2,289	1,769	7,588	43,532	55,178	53	41	140	451	0%	408	-	500	500
2,289	1,769	7,588	43,532	55,178	66	51	176	568	0%	514	-	700	700
2,289	2,500	6,857	43,532	55,178	41	45	99	353	0%	324	-	700	700
2,289	3,000	6,357	43,532	55,178	41	54	92	353	50%	327	164	700	864
2,289	3,500	5,857	43,532	55,178	53	81	108	451	100%	422	2,159	0	2,159
2,289	4,000	5,357	43,532	55,178	89	156	167	764	100%	723	723	0	723
2,289	4,500	4,857	43,532	55,178	151	297	256	1,293	100%	1,235	1,235	0	1,235
2,289	5,000	4,357	43,532	55,178	128	280	195	1,097	100%	1,058	1,058	0	1,058
2,289	5,500	3,857	43,532	55,178	101	242	136	862	100%	839	839	0	839
2,289	6,000	3,357	43,532	55,178	108	282	126	921	50%	905	452	0	452
2,289	6,500	2,857	43,532	55,178	89	254	89	764	0%	758	-	0	0
2,289	7,000	2,357	43,532	55,178	80	245	66	686	0%	686	-	0	0

WATER LOSSES - m^3					POND VOLUMES			
Concentrate Moisture Loss	Tailings Moisture Loss	Treat & Release Losses	TOTAL WATER LOSSES	NET WATER INFLOW	Actual Pond Volume	Model Pond Volume Beginning	Model Pond Volume End	100 Year Freshet Event - 30 day period
m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3
Z	AA	AB	AC	AD	AE	AF	AG	AH
Calc	Calc	Input	Calc	Calc	Input	Calc	Calc	Calc
136	639	0	-775	-275	750	750	475	
123	578		-700	0		475	475	
136	639		-775	-75		475	400	
113	563		-675	189		400	589	
97	523		-620	1,539		589	2,127	
94	506		-600	123		2,127	2,250	10,870
97	523		-620	615		2,250	2,865	
113	563		-675	383		2,865	3,248	
116	581		-698	142		3,248	3,390	
131	619		-750	-298		3,390	3,092	
136	639		-775	-775		3,092	2,317	
131	619		-750	-750		2,317	1,567	

DSTF WATER BALANCE												
INPUTS				OUTPUTS					WITHIN PILE	PREDICTED	VERIFICATION	
Total Precipitation to Unlined DSTF Area	Total Precipitation to Lined DSTF Area	Tailings Compaction Seepage	Total Inputs	Unlined DSTF Meteoric Infiltration to Ground	Lined DSTF Total Infiltration to Ground	Unlined DSTF Runoff	Lined DSTF Runoff	Total Outputs	Lined DSTF Meteoric Infiltration to Pile	Expected Total Reporting to DSTF Collection	Measured Tailings Moisture Content	Measured DSTF Input to Mill Site Pond
m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3
AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
Calc	Calc	Calc	Calc	Calc	Calc	Calc	Calc	Calc	Calc	Calc	Calc	Calc
175	41	-145	70	35	-145	0	0	-110	0	-145	13%	0
220	51	-131	140	44	-131	0	0	-87	0	-131		
123	45	-145	23	25	-145	0	0	-121	0	-145		
114	54	-70	98	23	-70	46	27	25	0	2		
135	81	-73	143	27	-73	108	81	143	0	116		
209	156	-70	295	42	-70	167	156	295	0	253		
321	297	-73	545	64	-73	256	297	545	0	481		
244	280	-70	454	49	-70	195	280	454	0	405		
170	242	-73	339	34	-73	136	242	339	0	305		
158	282	-70	369	32	-70	63	141	165	0	134		
111	254	-73	292	22	-73	0	0	-50	0	-73		
82	245	-70	257	16	-70	0	0	-54	0	-70		

Table 2. Mill Water Balance Model Parameter Verification Summary

Data/Input	Model Estimate	Estimate Basis	Verification Method	Verification Frequency
Precipitation	437 mm	Based on historic average precipitation measurements and mean annual precipitation-elevation relationship derived for the district	Hobo type tipping bucket precipitation gauge currently installed on top of Galena Hill. The Flame and Moth weather station and snow course are currently being commissioned and information from these sources will be used as model input once operational.	Weather Stations -- Download data on a monthly basis Snow Course – monthly measurements between January and March
Lake Evaporation	460 mm	Based on 1996 WREVAP modeling	Comparison with recent regional estimates (e.g. 2009 water balance study for Wolverine project, 1999 study for Carcross evaporation lagoon project)	N/A
Evapotranspiration	227 mm	Based on 1996 WREVAP modeling	Comparison with recent regional estimates (e.g. 2009 water balance study for Wolverine project, 1999 study for Carcross evaporation lagoon project)	N/A
Mill Throughput TPD	250 – 400 TPD	Based on mine plan	Mill throughput is measured using a belt weightometer on the ball mill feed belt	Daily
% Moisture Mill Ore	3%	Currently based on operating experience from similar underground mine operations and 2 months operating data	Samples from the crushed ore on the mill feed belt are taken and analyzed for % moisture in the assay lab	Weekly
% Ore to Concentrate	30%	Based on 2 months of operating data	Weigh all concentrate on truck scale prior to transportation offsite	Daily
% Ore to HP Tailings	0 %	Based on 2 months of operating data	Measure volume of high pyrite (HP) vs. (LP) tailings produced	Daily
% Ore to LP Tailings	75 %	Based on 2 months of operating data	Survey the volume of the DSTF stockpile and reconcile total monthly volumes	Monthly
% HP Tailings to DSTF	0%	Based on 2 months of operating data where no high pyrite tailings are produced	Survey the volume of the DSTF stockpile and reconcile total monthly volumes	Monthly
% Residual Moisture Tailings	14%	Based on estimates from the equipment manufacturer, experience from similar process equipment (filter presses) and 2 months of operating data	Samples from the dry stack tailings conveyor stockpile are collected and analyzed for % moisture in the assay lab.	Weekly
% Residual Moisture Concentrate	10%	Based on estimates from the equipment manufacturer, experience from similar process equipment (filter presses) and 2 months of operating data	Samples are taken from each truck of concentrate that is loaded and shipped of site and analyzed for % moisture in the assay lab.	Daily

3.3 *Mine Water Balance Model*

An operational water balance model for the Bellekeno mine has been developed that is designed to predict mine discharge for 2011 on a monthly basis, based on various hydrogeological and operational inputs and changes. As the mine development proceeds, the model will be calibrated on a monthly basis based on actual measured mine discharge at KV-43 and therefore will become optimized and more accurate as operations continue. Because the mine pool is not directly impacted by any stream flow, stream flow monitoring is not a consideration in the mine water balance. The water balance model as presented below is capable of modeling all phases, accounting for production changes, changing surface and underground developments, surface and underground storage volumes, and changing water use requirements associated with operations and closure phases of the Bellekeno undertaking. These variable inputs to the mine water balance model will be reviewed on an annual basis and used as a predictive tool for the upcoming year.

3.3.1 *Mine Water Balance Methodology*

Table 1 and Figure 2 represent the mill water balance model input and output parameters. All columns in the model are labelled from “A” to “AD” and the calculation methodology for each column is described following. Red coloured fonts indicate data input entries and black coloured fonts indicate calculated data.

Columns A - C are natural direct mine inputs:

- Column A **“Total Groundwater Capture”** – estimate of total groundwater captured by the underground workings of the Bellekeno mine. This estimate was based on the past 18 months post dewatering period actual measured outflow at KV-43 for the Bellekeno mine (see Figure 2).
- Column B **“Groundwater Capture, Upper Workings”** – An estimated 25% of total groundwater capture is captured in from the upper workings and reports directly to the 625 level, which free drains to the treatment plant at KV-43.

- Column C **"Groundwater Capture, Lower Workings"** – An estimate of 75% of the total groundwater capture reports to the lower mine workings in the East and 99 Zones. This water is pumped to the treatment plant at KV-43.

Column D is a direct water input

- Column D **"Makeup Water"** – Approximately 1 L/s of fresh makeup water is expected to be used during the open water period between May and September from Lightning Creek and/or Thunder Gulch.

Figure 2. Bellekeno Mine Discharge at KV-43

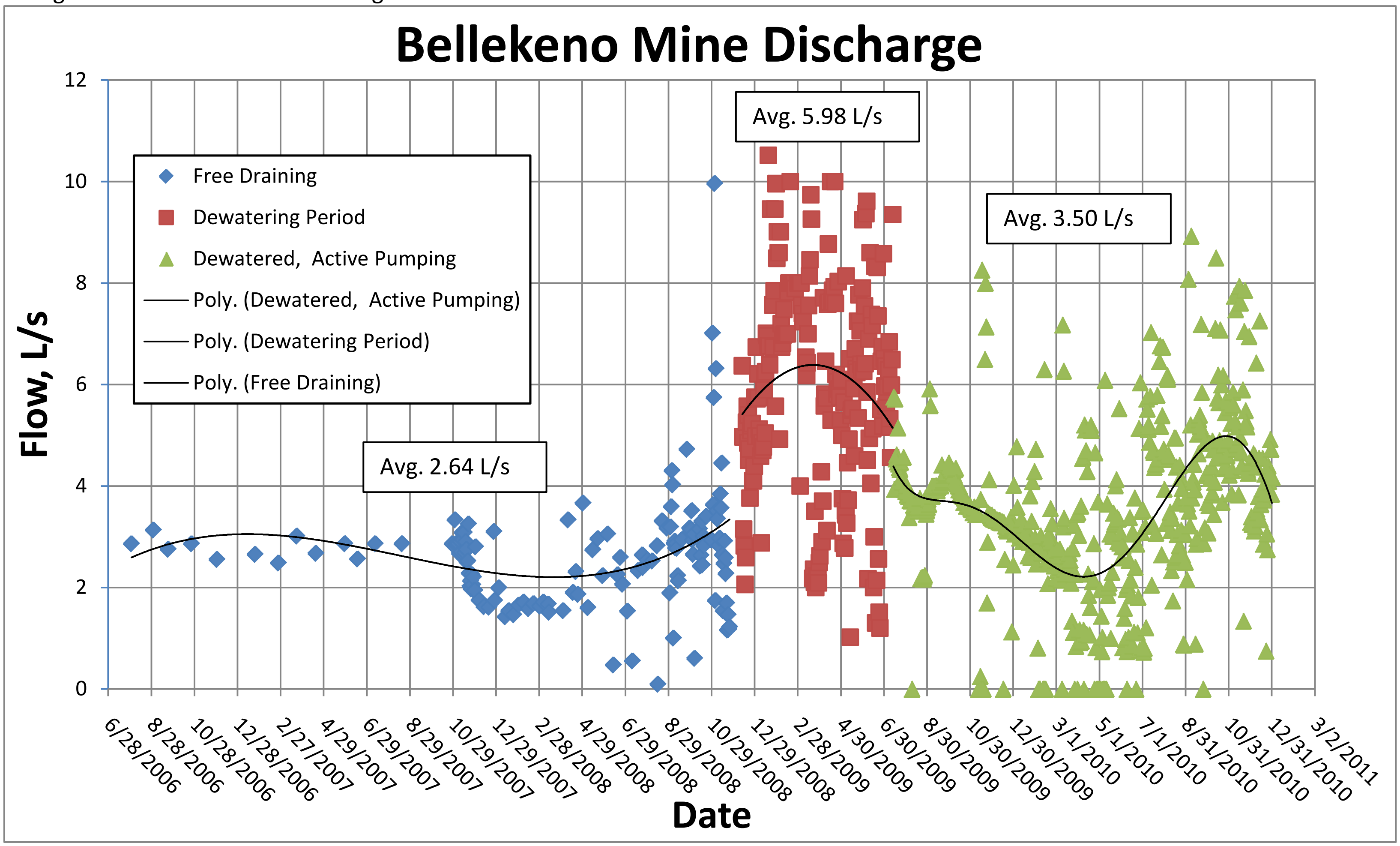


Table 3. Alexco Keno Hill Mining Corp Bellekeno Mine Water Balance Model

	MINE DIRECT INPUTS				OPERATIONS DATA												
Month	Total Ground water Capture	Ground water Capture Upper Workings	Ground water Capture Lower Workings	Makeup Water	ROM Ore to Mill	ROM Ore Moisture	Total Waste Rock	Waste Rock Moisture	Waste Rock to U/G Backfill	Waste Rock to Surface	Ore to HP Tailings	Ore to LP Tailings	HP Tailings to Mine	LP Tailings to Mine	Tailings Moisture	CRF Binder	CRF Moisture
Units	L/s	L/s	L/s	L/s	Tonnes	%	Tonnes	%	%	%	%	%	%	%	%	%	%
Column =>	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
Jan-11	3.5	0.9	2.6	0	7,750	3%	4,475	3%	45%	55%	0%	75%	100%	0%	14%	6%	30%
Feb-11	3.3	0.8	2.5	0	7,000	3%	4,475	3%	45%	55%	0%	75%	100%	0%	14%	6%	30%
Mar-11	2.6	0.7	2.0	0	7,750	3%	4,475	3%	45%	55%	0%	75%	100%	0%	14%	6%	30%
Apr-11	2.5	0.6	1.9	0	7,500	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
May-11	2.8	0.7	2.1	1	7,750	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Jun-11	3.8	1.0	2.9	1	7,500	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Jul-11	4.5	1.1	3.4	1	7,750	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Aug-11	5.0	1.3	3.8	1	7,500	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Sep-11	4.0	1.0	3.0	1	7,750	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Oct-11	3.7	0.9	2.8	0	7,500	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Nov-11	3.6	0.9	2.7	0	7,750	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%
Dec-11	3.5	0.9	2.6	0	7,500	3%	4,475	3%	45%	55%	0%	75%	100%	50%	14%	6%	30%

WATER INFLOWS - m^3					WATER LOSSES - m^3					NET OUTFLOW	
Total Groundwater Inflows	**Makeup Water**	**Tailings Backfill**	**Waste Rock Backfill**	**TOTAL WATER IN**	**ROM Moisture Loss**	**Waste Rock Moisture Loss**	**CRF + Concrete Hydration**	**TOTAL WATER LOSSES**	**NET WATER OUTFLOW**	**EXPECTED MINE DISCHARGE**	**ACTUAL MINE DISCHARGE**
m^3	**m^3**	**m^3**	**m^3**	**m^3**	**m^3**	**m^3**	**m^3**	**m^3**	**m^3**	**L/s**	**L/s**
R	**S**	**T**	**U**	**V**	**W**	**X**	**Z**	**AA**	**AB**	**AC**	**AD**
Calc	**Calc**	**Calc**	**Calc**	**Calc**	**Calc**	**Calc**	**Calc**	**Calc**	**Calc**	**Calc**	**Measurement**
9,204	0	0	60	9,265	233	74	544	850	8,414	3.2	
8,678	0	0	60	8,739	210	74	544	828	7,911	3.0	
6,837	0	0	60	6,898	233	74	544	850	6,048	2.3	
6,574	0	394	60	7,029	225	74	994	1,293	5,736	2.2	
7,363	2,630	407	60	10,460	233	74	1,009	1,315	9,145	3.5	
9,993	2,630	394	60	13,077	225	74	994	1,293	11,784	4.5	
11,834	2,630	407	60	14,931	233	74	1,009	1,315	13,616	5.2	
13,149	2,630	394	60	16,233	225	74	994	1,293	14,940	5.7	
10,519	2,630	407	60	13,616	233	74	1,009	1,315	12,301	4.7	
9,730	0	394	60	10,184	225	74	994	1,293	8,892	3.4	
9,467	0	407	60	9,934	233	74	1,009	1,315	8,619	3.3	
9,204	0	394	60	9,658	225	74	994	1,293	8,366	3.2	

Columns E to Q are from the mine plan and mill operations data:

- Column E **"ROM Ore to Mill"** – Tonnes of ore expected to be milled based on planned production of 250 tonnes/day throughout 2011, based on the current life-of-mine plan.
- Column F **"ROM Ore Moisture"** – amount of moisture in the ROM ore from the underground mine prior to milling. Based on actual measurements each month and estimated average for future months.
- Column G **"Total Waste Rock"** – an estimate based on planned 2011 production and development forecast.
- Column H **"Waste Rock Moisture"** – percentage moisture in the waste rock from the underground mine prior to milling. Based on actual measurements each month and estimated average for future months.
- Column I **"Waste Rock to U/G Backfill"** – percentage of waste rock as a proportion of the total which is expected to be used for underground backfill.
- Column J **"Waste Rock to Surface"** – percentage of waste rock as a proportion of the total which is expected to remain on surface and not be returned underground.
- Column K **"Ore to HP Tailings"** – the actual and estimated portion of ore milled that ends up as high pyrite tailings.
- Column L **"Ore to LP Tailings"** – the actual and estimated portion of ore milled that ends up as low pyrite tailings.
- Column M **"HP Tailings to Mine"** – the actual and estimated portion of high pyrite tailings that will be returned to the mine to be used in CRF backfill.
- Column N **"LP Tailings to Mine"** – the actual and estimated portion of low pyrite tailings that will be returned to the mine to be used in CRF backfill.
- Column O **"Tailings Moisture"** – the estimated and actual amount of moisture in the tailings that is either stored in the DSTF or transported to underground.
- Column P **"CRF Binder"** – the estimated and actual amount of cement used as a binder for CRF backfill.

- Column Q **“CRF Moisture”** – the estimated and actual amount of water content required for the optimum consistency for CRF backfill.

Columns R to V are mine water inflow calculations based on direct mine inputs and operations data:

- Column R **“Total Groundwater Inflows”** – calculated volume of water based on column A.
- Column S **“Makeup Water”** – calculated volume of water based on column B, representing water pumped into the mine from external sources.
- Column T **“Tailings Backfill”** – calculated volume of water based on columns E, K L, P, and O, representing water present in tailings returning to the mine in backfill
- Column U **“Waste Rock Backfill”** – calculated volume of water based on columns G, I, and H, representing water present in waste rock returning to the mine in backfill.
- Column V **“TOTAL WATER IN”** – sum of columns R-U.

Columns W to AB are mine water outflow calculations based on direct mine inputs and operations data:

- Column W **“ROM Moisture Loss”** – calculated volume of water based on columns E and F, representing water lost from the mine in ore to the mill.
- Column X **“Waste Rock Moisture Loss”** – calculated volume of water based on columns G, J and H, representing water lost from the mine in waste rock which will be left on surface.
- Column Z **“CRF + Concrete Hydration”** – calculated volume of water based on columns G, H, Q, J, E, L, N, Q and O, representing the water which will be required to produce suitable CRF material. This water is taken up (consumed) in the hydration reactions during hardening.
- Column AA **“TOTAL WATER LOSSES”** – sum of columns W-Z.
- Column AB **“NET WATER OUTFLOW”** – Difference between column V and column AA.

- Column AC **"EXPECTED MINE DISCHARGE"** – Column AB converted to L/s, representing expected mine discharge.
- Column AD **"ACTUAL MINE DISCHARGE"** – Actual mine flow discharge measurements, to be entered on a monthly basis comparison with modelled expected discharge.

3.3.2 Mine Water Balance Input Parameter Verification

A number of the input parameters required in the mine water balance model are based on design assumptions, field measurements and operating experience. These assumptions need to be verified and optimized as the operations gain experience and additional data measurements. Table 4 summarizes the input parameters, data source, frequency of measurement and provides the basis for verification of the water balance parameters.

Table 4. Mine Water Balance Model Parameter Verification Summary

Data/Input	Model Estimate	Estimate Basis	Verification Method	Verification Frequency
Groundwater Capture	3.5 L/s avg. annual flow, varies during the year	Based on post dewatering period average, planned new development	Annual update based on past year's data and prediction of mine development and in consultation with Hydrogeological Study Plan	Annually, and as needed if mine hydrogeological conditions change
Makeup Water	1 L/s between May-Sept	Expected freshwater makeup needs	Comparison with recent regional estimates (e.g. 2009 water balance study for Wolverine project, 1999 study for Carcross evaporation lagoon project)	Annually, and if mine makeup water needs change
ROM Ore Tonnes to Mill	7,500 tonnes/mo from Jan-June, 10,000 tonnes/mo from Jul-Dec	Based on anticipated milling, production, and development for the year	Comparison with mill tonnage throughput records	Annual, as needed if mine development/mill rate changes
Total Waste Rock	4,475	Based on mine development plan	Comparison with waste rock management plan records	Annually, as needed if mine development plan changes
% Moisture ROM Ore to Mill	3%	Currently based on operating experience from similar underground mine operations and 2 months operating data	Samples from the crushed ore on the mill feed belt are taken and analyzed for % moisture in the assay lab	Weekly
% Moisture Waste Rock	3%	Currently based on operating experience from similar underground mine operations and 2 months operating data	Assumed to be similar to ROM ore	Weekly
% Waste Rock to U/G	45%	Based on mine development plan	Survey of waste rock dump volumes and backfill records	Monthly

Data/Input	Model Estimate	Estimate Basis	Verification Method	Verification Frequency
Backfill				
% Waste Rock to Surface Storage	55%	Based on mine development plan	Survey of waste rock dump volumes and backfill records	Monthly
% Ore to HP Tailings	0 %	Based on 2 months of operating data where no high pyrite tailings are produced	Measure volume of high pyrite (HP) vs. (LP) tailings produced	Daily
% Ore to LP Tailings	75 %	Based on 2 months of operating data	Survey the volume of the DSTF stockpile and reconcile total monthly volumes	Monthly
% HP Tailings to Mine	100%	Mine development plan	Mine backfill records	Monthly
% LP Tailings to Mine	0% from Jan-Mar, 50% from Apr-Dec.	Based on mine development plan and backfill availability	Mine backfill records	Monthly
% Residual Moisture Tailings	14%	Based on estimates from the equipment manufacturer, experience from similar process equipment (filter presses) and 2 months of operating data	Samples from the dry stack tailings conveyor stockpile are collected and analyzed for % moisture in the assay lab.	Weekly
% Binder used for CRF	6%	Based on industry standard recommendations for optimal strength and two months of operating data	Mine backfill records	Monthly
% Moisture in CRF	30%	Based on industry standard recommendations for optimal strength and two months of operating data	Mine backfill records	Monthly

3.4 *Water Balance Report Annual Update*

In accordance with Clause 73 of the Licence, the Water Balance for the Bellekeno Mine and Keno District Mill will be updated annually.

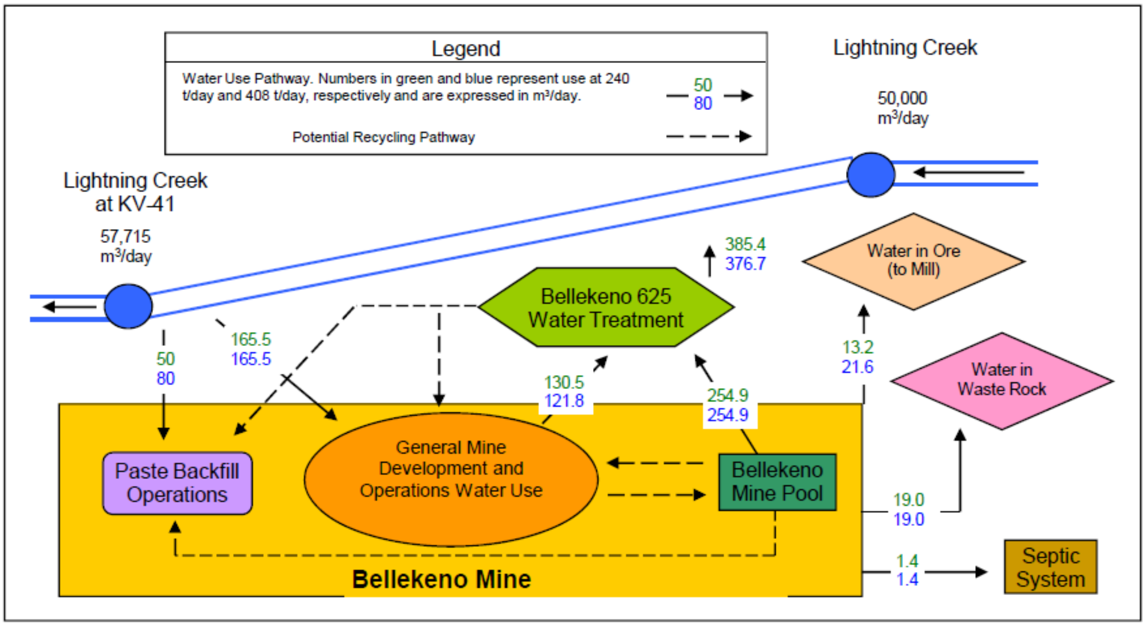
4.0 Water Management Protocols

Protocols for decision making on water management have been developed and are summarized in the following sections.

4.1 *Bellekeno Mine Water Requirements*

Water use requirements for the Bellekeno Mine are currently supplied from the recharge of the underground mine pool. Makeup water is also available and permitted for withdrawal from Lightning Creek as well as Bellekeno 625 treated decant water. Groundwater seepage through bedrock and vein fractures is collected in the Bellekeno Mine and is pumped to surface for treatment and release. A certain portion of the underground mine pool water is used for various mine development and operations requirements including equipment operation and paste backfill. The overall Bellekeno mine water balance presented in the water licence application is shown in Figure 3.

Figure 3. Bellekeno Mine Water Balance Schematic



There may be instances and operational requirements to use water from other permitted sources (i.e. Lightning Creek, Bellekeno 625 treated decant) instead of or in addition to the primary source of the underground mine pool.

Variations in water quality from the underground mine pool may necessitate withdrawing water from Lightning Creek rather than the underground mine pool. As an example, poor settling of suspended solids underground may limit the use of the underground mine pool water for equipment use due to potential damage of mechanical systems. Enhanced TSS settling in the surface ponds at Bellekeno 625 would be utilized to continue to treat and discharge to compliant levels but a lack of makeup water from high TSS underground could result in the use of Lightning Creek instead of the underground mine pool water.

Similar to the example of TSS, high ammonia in the underground mine pool from excessive recirculation may result in direct pumping to surface where enhanced ammonia reduction can occur. Additional make up water from Lightning Creek could be required under this scenario.

Operational changes underground may result in an extended period where mine pool water is not available for reuse and the need for withdrawal from Lightning Creek or Bellekeno 625 treated decant would be required. As an example, construction of larger underground sumps would result in the loss of makeup water for a period of time when the new sump is filling before a new decant pump can be installed. During this period, water from either Bellekeno 625 decant or Lightning Creek would be used to supplement mine operations requirements.

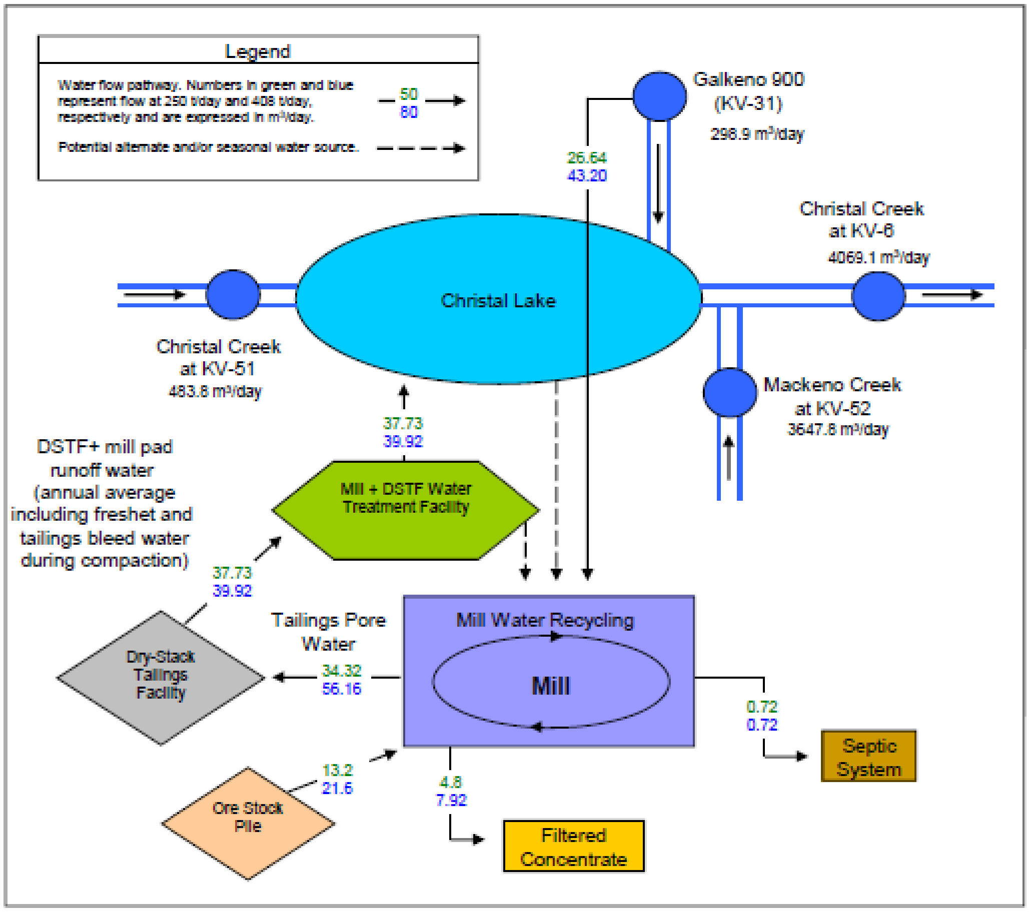
In terms of protocols and decision making, the Mine Manager is the primary person responsible for determining if these types of operational changes would require alternative water sources. In conjunction with Alexco Environmental Group support professionals, the decision would then be made to either withdraw water from Lightning Creek or Bellekeno 625 decant.

4.2 *Mill Site Water Requirements*

There may be operational or water quality changes that necessitate mill makeup water coming from sources other than Galkeno 900 treated discharge or mill pond water.

The mill water balance presented in the water licence application is shown in Figure 4.

Figure 4. Mill Water Balance Schematic



The two primary sources of water usage for mill makeup water are treated water from the Galkeno 900 adit and surface runoff collected in the mill pond. Surface water collected in the mill pond is generally only an option in the early spring – late fall period when active runoff is available. Alternative sources of mill makeup water other than these two sources may be necessary based on various operating conditions and changes. These potential conditions and changes include but are not limited to:

1. Change in process water chemistry requiring alternative makeup water chemistry. There may be times when the water in the mill pond requires treatment and release due to buildup of metals or pH fouling from excessive recycling. Treatment and release in accordance with regulatory standards would be conducted and fresh water from other sources would then be used to makeup the volume released.

2. Sludge generated in the Galkeno 900 lined treatment pond may inadvertently be collected in the vacuum truck and transported to the mill pond. If this occurs, an alternative location may be required.
3. Icing conditions on the surface of the Galkeno 900 pond may create liner damage if water removed from the pond for mill makeup requirements drops the ice layer on top of the liner.
4. Reduced flow from the Galkeno 900 adit results in insufficient volumes to supply mill makeup water requirements.
5. Insufficient surface runoff into the mill pond to provide makeup water.

In the event of these potential operations changes, alternative water sources may be used to supply mill makeup water. Alternative water sources include Christal Lake, shallow groundwater wells (not currently installed) downgradient of the mill and Bellekeno 625 treated water. In these examples, the Mill Manager would be in consultation with Alexco Environmental Group support professionals and a determination made if alternative water sources need to be used or developed and appropriate regulatory approvals would be secured for sources not currently approved by the Licence.

4.3 *Water Use Tracking*

Water used at the Bellekeno Mine and mill site is tracked on a daily basis. Makeup water is currently delivered to the mill using a 4,000 gallon vacuum truck and deposited either into the process water tank or the mill pond, depending on daily requirements. Water is accounted for through a daily form that is completed by the truck operator. Source and destination of water is marked as to the specific locations. An example of the water use tracking sheet is attached as Figure 5. Because of the filtered tailings system and efficient water recycling and reuse approach at the mill, the makeup water requirements are relatively small and the current use of a truck to deliver makeup water is adequate but longer term alternatives will be investigated. The merits of installing a pipeline from Galkeno 900 to the mill pond are currently being reviewed.

Water use at the Bellekeno Mine that is ultimately discharged through the Bellekeno 625 water treatment system is tracked on a continuous basis through a Seametrics DL76 datalogger. Instantaneous flow data is recorded every 4 minutes and the datalogger is downloaded on a weekly basis. An example of the water tracking method for the Bellekeno Mine is shown in Figure 6.

Figure 5. Sludge and Water Tracking Log

Sludge/Water Tracking Log **Operator:** **Week:**

Sludge Removal

Removed From	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Comment
SK 100								
GK 300 Sludge Pond								
GK 900								
BK 625								
Other:								
Other:								

Sludge Deposit

Deposited At	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Comment
Sime Pit								
Valley								
Mill/DSTF								
Other:								

Water Removal

Removed From	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Comment
Flat Creek								
SK 100								
GK 300 Old Pond								
GK 900								
Other:								

Water Deposit

Deposited At	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Comment
Lime Bay								
Mill (Tank or Pond)								
Other:								

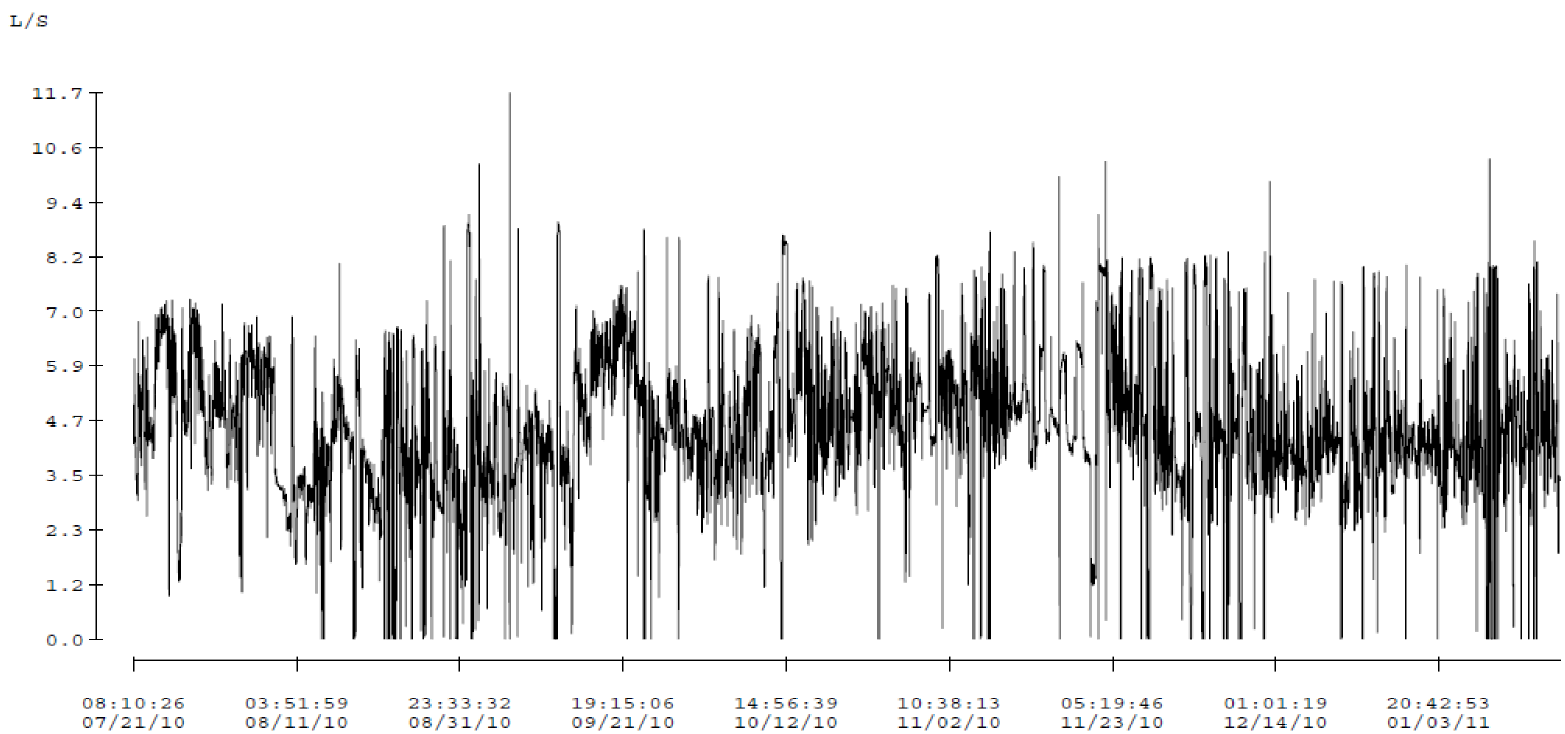
Lime Deposit

Deposited At	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Comment
SK 100								
GK 300								
GK 900								
BK 625								
Mill								
Other:								

Figure 6. Bellekeno 625 Flow Data Logger Record

Report for data logger :625

Start time: 07/21/10 08:10:26
End time: 01/19/11 09:06:33
Cycle : 240.05
Total 71751.81
Maximum flow rate: 11.74
Minimum flow rate : 0.00
Average flow rate: 4.56



5.0 Contingency Plans

Contingency plans for flood or drought conditions have been considered to ensure unexpected climatic conditions do not adversely affect mine/mill operations or result in significant environmental impact.

5.1 *Drought Conditions*

The current make-up water requirements at the mill are approximately 30,000 liters/day (0.35 L/s). This makeup water requirement is less than 5% of the combined flow emanating from Galkeno 900 and Bellekeno 625. The makeup water requirements at the mill also represent a very small portion of the Christal Creek drainage which has its headwaters near the mill site location. Given the relatively small volume of make-up water compared to current source levels, a reduction in make-up water available for mill operations due to a drought condition does not represent a concern from an operational standpoint and therefore no unique contingency plans are in place for a drought scenario.

The Bellekeno Mine produces excess water that must be collected and treated. Although the Bellekeno Mine produces approximately 4 L/s of constant discharge, only about 50% of the mine recharge volume is required for mine development and operations (equipment, paste backfill). The amount of water required to sustain mine operations is a small portion (1-2%) of the flow at Lightning Creek where mine makeup water is currently permitted for withdrawal. Similar to the mill makeup water requirements, a drought scenario does not represent a current operational concern for the Bellekeno Mine and a contingency plan is currently not in effect.

5.2 *Flood Conditions*

High flow or flood conditions at the mill do not necessarily pose an extreme case from an operational perspective as the mill site water management design already incorporates ditching and pond volumes based on extreme precipitation events (design capacity in excess of 1:100 year event). In addition, the mill site location is situated with a very small, headwater drainage basin (<3 km^2), effectively minimizing the potential for flooding conditions. In the case of a flood event, active milling operations may be temporarily suspended to ensure operations personnel and equipment are appropriately allocated to managing and maintaining ditches and conveyance structures until the peak flows have decreased to normal levels.

5.3 *High Mine Inflow Conditions*

Contingency and response plans for high or unexpected underground mine flows fall under the protocols of the company's emergency response plan.

The first priority in a high mine inflow condition is the safety and protection of the employees and contractors working underground at Bellekeno. If the water in-rush was of a nature that required immediate evacuation, the specific protocols for mine evacuation would be initiated by the Mine Manager or his designate (Section 8, Keno Hill Emergency Response Plan).

Once the safety of underground employees and contractors have been established, the nature of the water in-rush would be immediately investigated by the General Manager or his designate. Securing underground facilities and infrastructure would become the next priority after employee safety. Depending on the nature and level of the mine flow in-rush or high flow condition, a determination would be made if mobile equipment needed to be removed from certain levels and locations in the mine and brought to surface or to the central decline. Electrical utilities and infrastructure would be assessed to determine if areas of the mine needed to be isolated or removed from electrical power distribution.

The cause and extent of the high mine water flow condition would then be assessed by the General Manager, Mine Manager and other specialist positions on the site (i.e. Chief Engineer) to determine if the extent of the high mine flow was expected to continue or if flow conditions are expected to recede. Based on the level of high mine flow, the rate of dewatering would be increased to the maximum levels permitted in order to reduce the volume of mine pool. Standby pumps would be established if necessary to increase the volume of water being pumped from the underground mine. The Bellekeno 625 water treatment plant is permitted and capable of treating 10 L/s which is approximately double the current steady state flow conditions of the Bellekeno Mine. If the volume required for dewatering were to exceed permitted levels or if the Bellekeno 625 water treatment plant was not meeting discharge standards due to high sustained flows, the appropriate regulatory agencies would be contacted and consulted. If necessary, consideration would be given to applying for an Emergency Amendment under QZ09-092 to manage the high inflow conditions if all other measures were not effective.

6.0 REPORTING

The results of the Water Management Plan will be included with the annual report for Water Licence QZ09-092. Further to the identified reporting requirements previously identified in clause 83 additional reporting requirements are outlined in clause 54 of Water Licence QZ09-092:

> *Unless otherwise specified in this licence, all monitoring data, reports, plans, studies, study results, designs or manual shall be submitted to the Board in the following format:*
>
> *a) All reports required to be submitted to the Board will be unbound and reproducible by standard photocopier, accompanied by one electronic copy on a CD/DVD.*
>
> *b) The Licensee shall provide to the Board 5 additional copies of all reports. The additional copies may be either 5 bound paper copies or 5 electronic copies on individual CDs/DVDs.*
>
> *c) Electronic copies shall be IBM compatible in one of the following formats: Word 97-2003, Excel 97-2003 workbooks, or Adobe .pdf format. Water quality results must be presented in Excel 97-2003 .xls format.*